Hyperparathyroidism

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SUMMARY

Because of the variable and vague clinical symptoms of the disease, diagnosis of hyperparathyroidism may be missed or delayed.

Presenting symptoms and findings may be localized to the urological system or to the skeletal framework, with indications of abnormal blood calcium levels.

In any case in which the patient's only complaints are malaise, lassitude, or progressive weakness, and in which routine laboratory findings are inconclusive, the blood calcium level should be determined.

While not in itself diagnostic, a high level of calcium in the blood will lead to further investigation such as skeletal x-ray studies and blood phosphorus and serum alkaline phosphatase determinations.

Vigilance postoperatively to forestall tetany is of great importance.

IN 1891 Von Recklinghausen described the disease of bone known as osteitis fibrosa cystica, but not until 1915 did Schlogenhaufer note the coincidence of that disease and tumors of the parathyroid glands. In 1926, Mandl of Vienna first explored the neck of a patient with osteitis fibrosa cystica, removed a tumor, and effected a cure.

The forces which mobilize the skeletal calcium usually begin as the result of increased pathological production of parathormone in a parathyroid tumor. The classical case of hyperparathyroidism, then, is associated with an isolated adenoma or adenomas, but the disease may be the result of parathyroid hyperplasia. It has been generally confirmed by experience all over the world that Von Recklinghausen's disease is caused by primary hyperparathyroidism, which means that in the vast majority of cases the existence of one or two parathyroid adenomas or diffuse hyperplasia of the entire parathyroid tissue is the causative factor. However, there is not yet a full understanding as to the types of cases in which adenomas develop or as to when hyperplasia of the parathyroid tissue occurs.

Usually hyperparathyroidism progresses slowly. It is encountered more frequently in women than in men and the incidence is greatest in persons between 30 and 60 years of age. The first symptoms usually occur in the extremities, the pelvis, or spine and consist of pain in these parts. Occasionally the first striking sign of the disease is spontaneous fracture, which may lead to roentgen study and diagnosis. Very often the diagnosis of hyperparathyroidism is made quite accidentally in the course of study of x-ray films made for other reasons. The roentgen signs of the disease in the skeletal system are: Generalized decalcification and demineralization of the bones; cysts or giant-cell tumors, or a combination of both; multiple renal calculi, or calcific deposits in joints, in bursae, or in the glands such as the parotid or prostate.

There exists no characteristic localization within the osseous system and the changes may occur anywhere. It is, indeed, an essential part of the roentgen diagnosis that there is no special localization but that large portions of the skeleton are involved. Usually the bone symptoms are not the only indication of the disease. There is almost invariably lassitude and weakness. Vague gastrointestinal manifestations are common. After some time, urogenital symptoms are likely to appear.

CASE REPORT

A boy of 19 complained of pain in the right knee joint after a fall. He also complained of constant, low grade pain in the posterior thoracic region and in the fingers and wrists. He insisted that he was smaller in stature, by one inch, than he had been a year before. Muscular weakness, listlessness, and general apathy were admitted.

A year previously the patient had been in a hospital for two weeks with gross hematuria which was diagnosed as caused by "contusion of the kidney."

The patient was apparently underweight, and there was definite facial pallor. He was unable to elevate the full weight of the body on the balls of his feet, because of general weakness in extremities. A mass, of almond size and shape, could be palpated in the left parotid gland. The thyroid gland was palpable, and an ill-defined mass approximately 1 cm. in diameter was felt in the region of the left lobe. Examination of the heart and lungs revealed no abnormalities. There was slight kyphosis in the lumbar region. Tenderness was noted over the region of the ninth and tenth dorsal vertebrae. The fingers were enlarged in the region of all the interphalangeal joints and there was pronounced tenderness in both hands when gripped. Neurological examination revealed no abnormalities.

There was definite evidence of excessive calcium in the urine as determined by the Sulkowitch test. Result of a Kahn test for syphilis was negative. Serum phosphorus determinations on three occasions were as follows: 2.9 mg., 3.2 mg. and 3 mg. per 100 cc. of serum (normal is 3.7 mg.); and the serum acid phosphatase content was 2.3, 2.2 and 2.3 King-Armstrong units per 100 cc. (normal is 3 units). Serum calcium content on two occasions was 20 mg. per 100 cc. and on another, 19 mg.

X-ray films of the long bones, cranium, vertebrae, abdomen and parotid gland showed remarkable demineralization and decalcification of all the bones, with compression fractures of the 2nd, 3rd, and 4th lumbar vertebrae. There were calcium deposits in the parotid gland and in the trochanteric bursae, and multiple calculi in both kidneys.

At operation through a Kocher incision, a tumor mass at the lower pole of the left lobe of the thyroid gland was encountered and was easily removed. It was walnut brown,

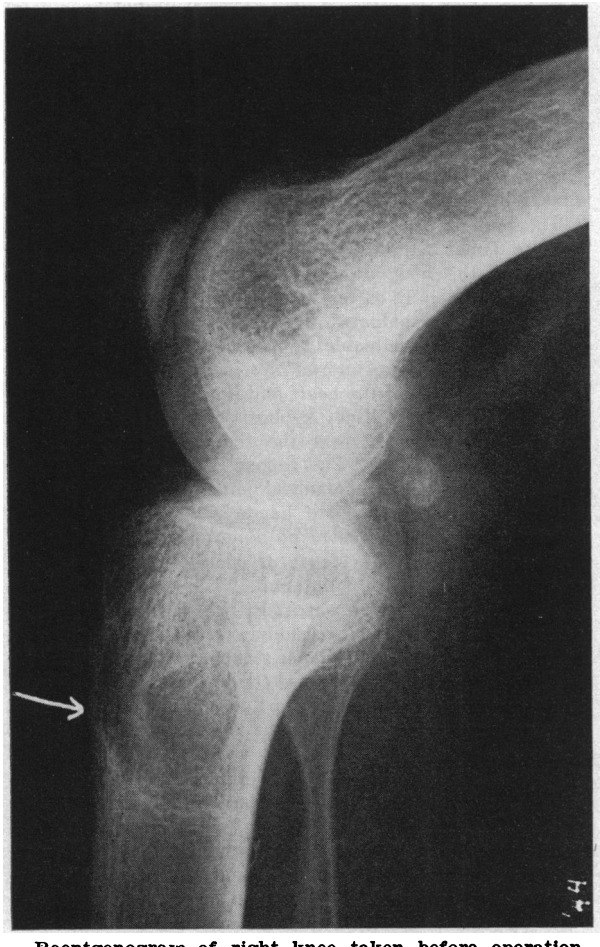
well encapsulated and measured approximately 3 by 3 cm. in diameter.

The postoperative course was entirely uneventful. Calcium gluconate was given intravenously, although no symptoms of tetany developed. The patient left the hospital on the 7th postoperative day. He was examined frequently for the next 12 months.

From the outset there was clinical evidence of a return to normal calcium balance, with gain in general strength and weight. The patient became robust and cheerful. The urine remained calcium-free after three months postoperatively. The patient grew one inch in height in the first year after operation and an additional three-quarters of an inch in the next two years. He was also 32 pounds heavier.

Roentgen films showed remarkable evidence of remineralization of the bones, especially in the bone cysts. There were still small calculi in both kidneys and in the parotid gland.

The tumor was a benign adenoma. Although there are reports of invasive carcinomas in such circumstances, from a practical point of view malignant tumors do not appear to play an important role in connection with hyperparathyroidism. Usually the tumors found in this association are classified as Grade 1, and there are no reports of recurrences or metastases. Such tumors may be single or multiple. They are yellowish brown, chocolate, or bluish gray in color, and are well encapsulated. They may be large enough to be palpated. Often, however, they may be impalpable because of small size or inaccessible position.



Roentgenogram of right knee taken before operation. Note advanced demineralization and bone cyst formation; also calcific deposits in joints.

Microscopically the adenoma usually consists of masses or cords of large, water-clear cells which may have a ballooned appearance owing to abundant glycogen content. There may be many oxyphil cells which are present in the normal parathyroid gland. Cases in which malignant parathyroid tumors caused hyperparathyroidism have been reported much less frequently (only seven in the literature) than cases of malignant parathyroid tumors not causing hyperparathyroidism.

The tumor may be embedded in the thyroid gland, or it may be situated in the upper posterior or anterior mediastinum behind the sternum, in the vicinity of the common carotid artery or in the region of the phrenic nerve. Occasionally instead of an adenoma there may be diffuse hyperplasia affecting all four parathyroid glands.

In the late stages of the disease with all the positive laboratory findings of renal involvement and/or x-ray evidence of changes in the bones, the diagnosis of osteitis fibrosa cystica usually is not difficult. However, when the symptoms or complaints are those of hypercalcemia alone, not only may there be diagnostic confusion, but a patient hospitalized with undiagnosed hyperparathyroidism may sometimes become progressively worse and die because of the ill-defined, non-specific character of the presenting symptoms.

As has been said, palpation of a parathyroid tumor is not always possible. Indeed such tumors are palpable in probably not more than 5 to 10 per cent of cases. Moreover, palpatory findings are misleading, and what is thought to be a parathyroid tumor is often actually a lobe of the thyroid gland.

If in the presence of hyperparathyroidism palpation for a mass is negative or undecisive, thorough roentgen examination should precede operation in order to ascertain whether the tumor lies in the anterior or posterior mediastinum and whether there is displacement of the trachea or kinking of the esophagus.

The tumor is easily removed if immediately accessible. It is best encountered through the usual Kocher incision. Thorough search must be made for multiplicity of tumors. If no tumor is found after diligent search, the mediastinum should be investigated. Parathyroid adenomas have been found in this region—sometimes even after a previous operation has been unsuccessful in locating a tumor.

Forestalling postoperative tetany is a matter of great importance. As a rule, after operation for hyperparathyroidism, especially in cases in which there are pronounced pathologic changes in the bones and high serum phosphatase, the originally high content of calcium in the blood drops abruptly, frequently to a level below the level which may induce tetany (7 mg. per 100 cc.). The decalcified skeleton reabsorbs the calcium from the plasma so rapidly that the calcium current, which before the

operation went from skeleton to blood, is reversed. The quantities of calcium that are withdrawn from the blood plasma are so large that hypocalcemia and tetany can result. The cardinal symptom of this process is increased irritability of the peripheral motor nerves so that they are more easily excited by electrical stimulation (Erb's sign), mechanical stimulation (Chvostek's sign) or asphyxia (Trousseau's sign) than are normal nerves. Most patients do not experience convulsions but complain of stiffness in various muscles, especially those of the fingers, legs, face and neck, and of cramps in the extremities. There may be spastic contractions in the fingers and toes and these may be aggravated by temporary circulatory occlusion. Measures to control tetany are: (1) oral or intravenous administration of calcium, (2) administration of vitamin D, (3) administration of A. T. 10 (dihydrotachysterol), and, (4) implantation of parathyroid tissue.

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